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Activity and Habits Affecting Skeletal Health Among Premenopausal
Military Women Protocol 9

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FOREWORD

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Michael M. McDermott 16 Aug 95
PI - Signature Date

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Introduction

The attainment of maximal peak bone mass in the premenopausal years is important in the prevention of postmenopausal osteoporosis. Peak bone mass, which occurs at approximately age 35 years in women, appears to be an important determinant of the risk of developing postmenopausal osteoporosis. Three factors are considered major contributors to the development of peak bone mass: genetics, calcium intake and physical activity. Additionally a number of adverse risk factors including smoking, alcohol consumption and caffeine consumption may have detrimental effects during this period. Numerous studies in adolescents (1-7) and young adults (8-13) have shown that past and current calcium intake make a significant contribution to skeletal mass, while some have shown equivocal or no demonstrable beneficial effects (14-18). Exercise, similarly, has shown positive effects in teenagers (4,7) and young adults (9,10,13) in some but not all (14,16-18) studies. These topics have been the subject of recent extensive literature reviews which conclude that both calcium intake and physical activity are important for the development of optimal premenopausal bone mass (19-22). Broad based national surveys conducted from the 1970's until recently have consistently demonstrated that females of all ages, races and ethnic groups in the United States consume less than the recommended daily allowance (RDA) of calcium (23-26). There is much less information on the level of exercise and on smoking, alcohol intake and caffeine consumption in women in the

18-40 year old age group in this country. Furthermore such information has not, to our knowledge, been collected in active duty military women. There is reason to believe that active duty military women may differ from the general population, although there is no data to confirm this impression. Potential areas where differences may occur, at least in some military women, include living accommodations, dietary habits, smoking and alcohol habits, level of physical activity and exercise, participation in field training exercises, deployments and frequent moves. One recent study has suggested that active duty military women may have an increased risk of stress fractures and that smoking, amenorrhea and a family history of osteoporosis may be significant risk factors (27). In this study, questionnaires will be mailed to 1000 active duty premenopausal women selected randomly from personnel files.

Questionnaires will be approximately 2 pages long and will ask questions regarding daily and weekly intakes of specific high calcium foods and calcium supplements, performance of specific aerobic and resistive exercises, and daily quantity of smoking, consumption of alcoholic beverages and consumption of caffeine containing beverages. Participants will be asked to return their completed questionnaires to the investigators who will tabulate the data in order to determine the mean levels, ranges, standard deviations and standard errors of the study variables. If there are sufficient numbers, subgroup analysis according to job types, age, locations and marital status will be performed.

A subset of 100 participants who are stationed at nearby installations are being recruited to participate in a bone density study. All subjects will have blood drawn for a CBC and measurement of serum calcium, phosphorus, chloride, alkaline phosphatase, PTH and TSH and will have their bone density measured in the lumbar spine, femoral neck, mid-radius and distal radius by dual energy X-ray absorptiometry (DEXA). Site specific bone density values will then be correlated with the various skeletal health factors elicited on the questionnaires with standard multiple regression analyses.

It is also important to ascertain which factors are most closely related to site-specific skeletal development and maintenance. This information will be used to assess current skeletal health habits among premenopausal military women and to plan programs and measures to improve skeletal health in this population.

Body

A total of 1,640 questionnaires have been mailed to active duty women in the continental United States as of July 31, 1995. Of these, approximately 600 have been returned for a response rate of 35%. Names and mailing addresses of active duty women have been obtained from military installations in Colorado, Wyoming, Kansas, Missouri and Arizona and it is anticipated that a total of 3,000 questionnaires will be mailed to achieve the target of 1,000 questionnaires from which data will be tabulated. Prior to mailing, the questionnaires were screened by ten individuals to ensure that the questions and formats were easily understandable. In addition, the questionnaires are validated by personal interviews with the 100 individuals included in the subset of volunteers to undergo further study as described above. One hundred individuals from nearby military installations who completed the above questionnaire were recruited to undergo further study with bone related laboratory testing and bone density determinations. These individuals also undergo a physical examination including body fat content determination using caliper measurements. Approval was also received to further test these individuals body fat content using bioelectrical impedance which was measured after the individuals signed a separate consent form. A second questionnaire was also completed by these individuals which asked them to recall calcium intake during their high school years.

As the data is in the process of being assembled, no

analysis of the data will be undertaken at this point. It is felt based on the responses to the validated questionnaires that the information gained from the study will be accurate and useful in meeting the objectives outlined for this study.

Conclusions

Data collection from the calcium intake, physical activity, and habits questionnaires sent to active duty women is progressing well with approximately 35% of the 1,640 mailed questionnaires having been returned as of July 31, 1995. Forty-two individuals have so far been recruited to participate in the subset of 100 volunteers to undergo physical examination, laboratory testing and bone density determinations. As data is still being collected no analysis of the received data will be performed at this time. It is anticipated that through further mailing for a total of 3,000 questionnaires, that the study objective of 1,000 questionnaires will be easily attainable.

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